

Agilent Programmable Sample Dispenser PSD 120

User's Guide



Agilent Technologies

Notices

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Safety Notices

CAUTION

A CAUTION notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a CAUTION notice until the indicated conditions are fully understood and met.

WARNING

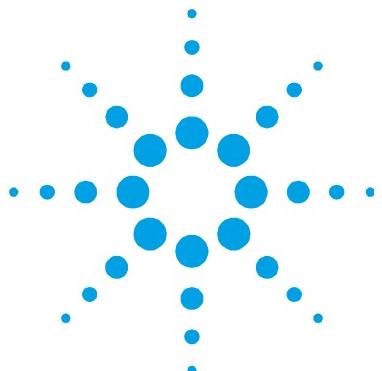
A WARNING notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a WARNING notice until the indicated conditions are fully understood and met.

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1. Safety Practices and Hazards

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General

Operation of the Programmable Sample Dispenser (PSD) accessory involves the use of moving parts and dangerous chemicals. Unskilled, improper, or careless use of this accessory can cause serious injury to personnel, or severe damage to equipment and property.

Appropriate safety practices have been included in this operation manual and your spectrometer operation manual, to help you operate the equipment safely. Read all safety practices thoroughly before attempting to operate your system.

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Hazard Warnings

In addition to the hazard warnings specified in your spectrometer operation manual, specific hazard warnings have been included in this operation manual. These warnings state the hazard, describe how to avoid it and specify the possible consequences of not following the instructions. Read all warnings carefully and observe them at all times.

Electrical Hazards

Power to the PSD is supplied by the Graphite Tube Atomizer (GTA) accessory. Refer to the GTA operation manual for specific details. Panels or covers retained by screws on the PSD may be opened only by an Agilent field service engineer.

A blown fuse should be replaced only with one of the size and rating specified in the text adjacent to the fuse holder. Always ensure that the accessory is turned off and disconnected from the mains supply before attempting any replacement.

Chemical Hazards

The PSD accessory may involve the use of materials that are corrosive or otherwise hazardous. Careless, improper or unskilled use of these materials can cause serious personal injury or an environmental hazard.

Always ensure that laboratory safety practices governing the use, handling and disposal of hazardous materials are strictly observed. These safety practices should include wearing the appropriate safety clothing.

Always ensure that the sample introduction system is thoroughly flushed with distilled water and that the contents of the drain or waste container are known and disposed of if necessary before touching any part.

Notes and Tips

A Note or Tip message is used to give advice or additional information

NOTE

This is a note.

Warning and Caution Messages

A Warning message is used in the text when failure to observe instructions or precautions could result in death or injury.

WARNING

Name of Warning

Detail of hazard. Information on how to avoid the hazard.



A Caution message is used when failure to observe instructions could result in damage to equipment (Agilent supplied and/or other associated equipment).

CAUTION

This is a caution statement.

Warning Symbols

The following is a list of symbols that appear in conjunction with warnings in this manual and on the spectrometer. The hazard they describe is also shown.

A triangular symbol indicates a warning. The meanings of the symbols that may appear alongside warnings in the documentation or on the instrument itself are as follows:



Corrosive liquid



Electrical shock



Fire hazard



Hot surface



Moving parts



Noxious gas



*Heavy weight
(danger to feet)*



*Heavy weight
(danger to hands)*



Sharp objects

The following symbol may be used on warning labels attached to the instrument. When you see this symbol, refer to the relevant operation or service manual for the correct procedure referred to by that warning label.



Information Symbols

The following symbols appear on the instrument for your information.

	Mains power on
	Mains power off
	Fuse
	Single phase alternating current
	When attached to the rear of the instrument, indicates that the product complies with the requirements of one or more EU directives.
	When attached to the rear of the product, indicates that the product has been certified (evaluated) to CSA 61010.1 and UL 61010-1

Color Coding

The various indicator lights appearing on the instrument and any associated accessories have been color coded to represent the status of the instrument or accessory:

- A green light indicates the instrument is in normal standby condition.
- A blue light indicates that operator intervention is required.
- An orange light indicates a potential hazard.
- A red light indicates danger or an emergency.

CE Compliance

Your PSD has been designed to comply with the requirements of the Electro-magnetic Compatibility (EMC) Directive and the Low Voltage (electrical safety) Directive (commonly referred to as the LVD) of the European Union. Agilent has confirmed that each product complies with the relevant Directives by testing a prototype against the prescribed EN (European Norm) standards.

Proof that a product complies with the Directives is indicated by:

- The CE Marking appearing on the rear of the product.
- The documentation package that accompanies the product, containing a copy of the Declaration of Conformity. This Declaration is the legal declaration by Agilent that the product complies with the Directives, and also shows the EN standards to which the product was tested, to demonstrate compliance.

Electromagnetic Compatibility

EN55011/CISPR11

Group 1 ISM equipment: group 1 contains all ISM equipment in which there is intentionally generated and/or used conductively coupled radio-frequency energy which is necessary for the internal functioning of the equipment itself.

Class A equipment is equipment suitable for use in all establishments other than domestic and those directly connected to a low voltage power supply network which supplies buildings used for domestic purposes.

This device complies with the requirements of CISPR11, Group 1, Class A as radiation professional equipment. Therefore, there may be potential difficulties in ensuring electromagnetic compatibility in other environments, due to conducted as well as radiated disturbances.

Operation is subject to the following two conditions:

- 1** This device may not cause harmful interference.
- 2** This device must accept any interference received, including interference that may cause undesired operation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try one or more of the following measures:

- 1** Relocate the radio or antenna.
- 2** Move the device away from the radio or television.
- 3** Plug the device into a different electrical outlet, so that the device and the radio or television are on separate electrical circuits.
- 4** Make sure that all peripheral devices are also certified.
- 5** Make sure that appropriate cables are used to connect the device to peripheral equipment.
- 6** Consult your equipment dealer, Agilent Technologies, or an experienced technician for assistance.
- 7** Changes or modifications not expressly approved by Agilent Technologies could void the user's authority to operate the equipment.

ICES/NMB-001

This ISM device complies with Canadian ICES- 001.

Cet appareil ISM est conforme à la norme NMB-001 du Canada.

Safety Practices and Hazards

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2. Introduction

This manual describes your Programmable Sample Dispenser (PSD), and tells you how to set up and maintain it. Once the PSD is installed, control is via your SpectrAA system software (refer to your spectrometer operation manual).

Your PSD is designed to be used in conjunction with the Graphite Tube Atomizer (GTA), automatically delivering measured volumes of sample to the furnace. The PSD consists of the sampler unit, sampler arm and capillary, sample carousel, and carousel cover. A rinse bottle screws into the underside of the PSD.

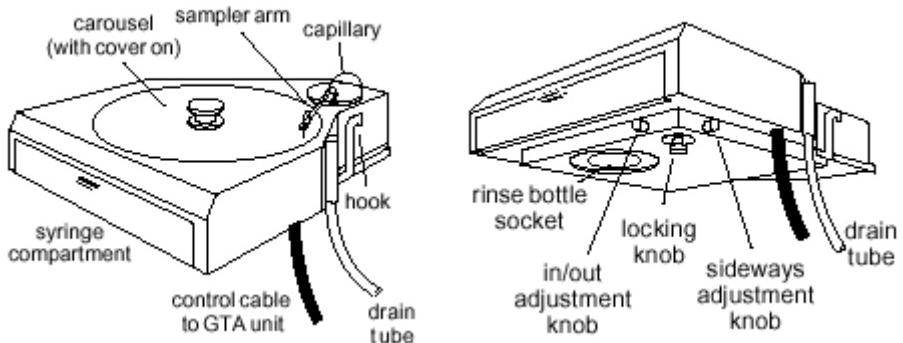


Figure 1. Two views of an Agilent PSD 120 programmable sample dispenser, shown here without the rinse bottle

Introduction



Figure 2 Agilent PSD 120 programmable sample dispenser

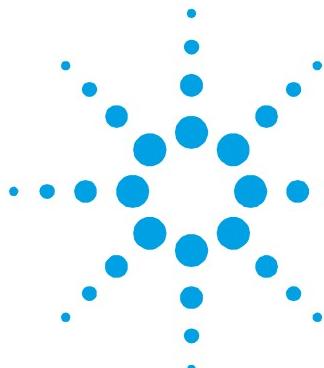
When in use, the PSD mounts on the front of the sample compartment of your spectrometer, with the carousel containing the required solutions for your analysis. A high precision motorized syringe controls sample volume delivered to the furnace. A cover helps protect your solutions.

When your PSD is set up, you can lock it into position, using the locking knob on the underside of the PSD. This will prevent the PSD being knocking out of alignment.

The PSD is connected to the control unit of the GTA by a 25-pin control cable, and gas and water are supplied by connection to the GTA power supply. The electrical controls for the sampler are built into the GTA control unit.

When your PSD is not in use, you can store it as a free-standing unit using the built-in legs.

For operation using manual injection it is not necessary to remove the programmable sampler, but you must disconnect the sampler from the furnace power supply.



3. Specifications

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Environmental

Your accessory is designed for indoor use only. In addition, this accessory is suitable for the following categories:

- Installation category II
- Pollution degree 2
- Equipment class I

Condition	Altitude	Temp t (°C)	Humidity (%RH) non-condensing
Non-operating (transport)	0–2133 m (0–7000 ft)	5–45	20–80
Operating within performance specifications	0–853 m (0–2800 ft) 853–2133 m (2800–7000 ft)	10–35 10–25	8–80

Power

Power is supplied by the GTA.

Electrical Connections

The PSD connects to the GTA using a 25-pin D-range connector

Weights and Dimensions

NOTE

The PSD is packed with the GTA.

Weight

Unpacked	6.5 kg (15 lb)
-----------------	----------------

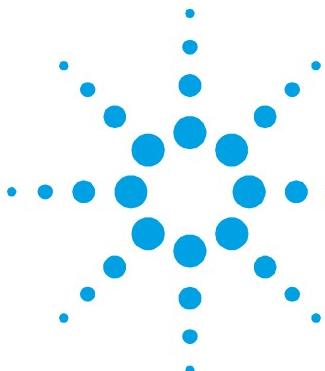
Dimensions (W × D × H)

Unpacked	
- without bottle	310 × 360 × 170 mm (12 × 14 × 7 in)
- with bottle	310 × 360 × 310 mm (12 × 14 × 12 in)

Length of control cable to GTA is 1030 mm (41 in).

Gas Supplies

Gas connection is through a GTA outlet by a PVC hose with snap-on connector.



4. Getting Started

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Installing Your PSD

Before you install your PSD, make sure your Graphite Tube Atomizer (GTA) is installed and optically aligned. Refer to your GTA operation manual or your spectrometer operation manual for details on how to do this.

To install your PSD:

- 1 Remove all shipping packaging material.

NOTE

The PSD must be positioned so that the carousel is horizontal. To achieve this for different Agilent AA models an adjustment plate is fitted to the base of the PSD. Instruments with a curved burner shield (Agilent 200 Series AA) will need this adjustment plate fitted in a different orientation to that used by other AA models, to achieve horizontal positioning of the carousel.

Getting Started

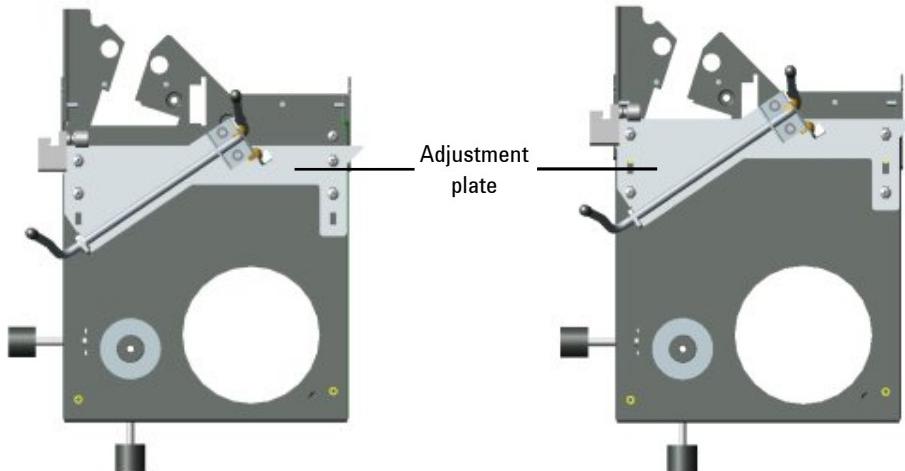


Figure 3 Adjustment plate as viewed from beneath the PSD. The plate is attached to the PSD bracket with four screws. The orientation required for use with Agilent 200 Series AA is shown in the left picture; all other models use the orientation shown in the picture on the right.

- 2 Move the PSD to the front of the sample compartment, and engage the two hooks (one at each side) over the two studs in the sample compartment.

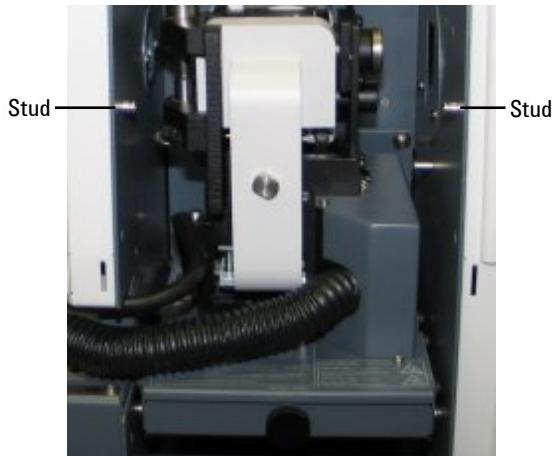


Figure 4 Studs on either side of the sample compartment

- 3 Ensure that each hook is seated in the groove in the stud.

NOTE

The mounting bracket may need to be adjusted (using four screws in slotted holes) to ensure the unit sits squarely and horizontally on the unit.

-
- 4 Make sure the block on the right-hand underneath side of the PSD is correctly sitting over the edge of the sample compartment and lock into position with the clamping screw.

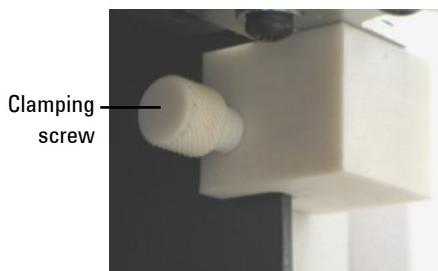


Figure 5 The block located underneath the PSD

NOTE

The unit should not wobble from side to side.

-
- 5 Remove the cover and hold the carousel over the PSD turntable. Turn the carousel to align the spigot on the turntable with the hole in the base of the carousel and lower the carousel onto the turntable.



Figure 6 Carousel

- 6 Attach a suitable length of 6 mm ID laboratory tubing to the drain outlet, which is located underneath the PSD on the right-hand side near the spectrometer. Place the free end of the tubing in a suitable waste vessel. The tubing and waste vessel must be arranged so that rinse solution will drain freely into the vessel. Do not submerge the tube end in liquid.
- 7 Unscrew and remove the rinse bottle, and fill it with acidified distilled water or some other suitable rinsing agent. The recommended rinse solution for aqueous samples is 0.01% nitric acid.

TIP

The addition of 0.002% Triton X100 is often useful, particularly with biological samples.

-
- 8 Screw the bottle firmly back into place on the dispenser, making sure the o-ring is in place.

NOTE

This bottle will be pressurized with inert gas during Step 11. If the bottle is not securely sealed you may hear inert gas leaking from the bottle. If left unsealed, the system might not operate correctly.

- 9 Fill the rinse station with distilled water.

CAUTION

Always switch the GTA power supply off before connecting or disconnecting the sampler connecting cable, otherwise the system may lock up.

- 10 Ensure that the GTA power supply is switched off. Plug the sampler connecting cable into the 25-pin socket on the GTA control unit. The cable should be routed with the umbilical cord behind the removal cover on the left side of the instrument. (Refer to your GTA manual for more information).
- 11 Plug the gas supply tube into the gas connector socket of the GTA control unit. (Refer to your GTA manual for more information.)



Figure 7 Location of the PSD gas and control cable connectors on the GTA

TIP

Disconnect the gas connection when not using the PSD.

-
- 12** Fit the dust cover to the carousel. Leave the dust cover in position throughout your analytical program.

Setting up the Probe Holder

The position of the probe holder should be set so that it does not get immersed into either the samples or the rinse solution.

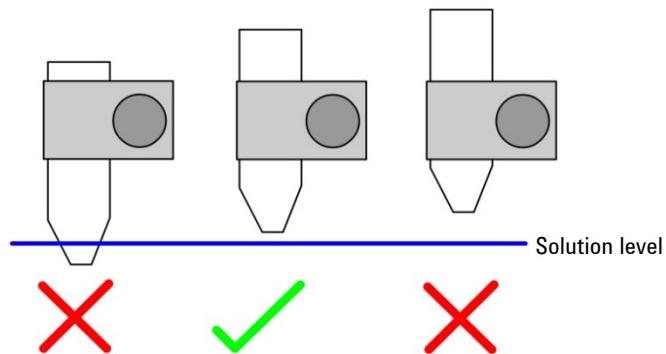


Figure 8 Correctly setting the probe holder position

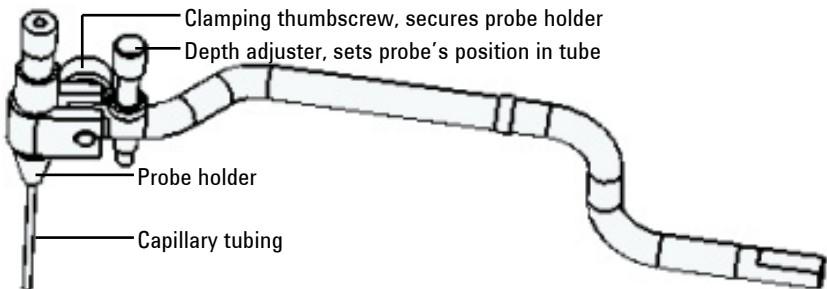


Figure 9 Diagram of the probe arm and probe holder assembly

Fitting the Probe

Capillary tubing is used to form the probe which collects and delivers the sample, standard, and rinse solutions. Agilent capillary assemblies are supplied with screw-in fittings at one end of the tubing, so they are ready to connect to the PSD's syringe.

To fit the capillary tubing:

- 1 Push the free end of the capillary tubing through the capillary guide. The capillary exits from the guide at the rear of the PSD as shown below.



Figure 10 Pushing capillary through the guide

- 2 Connect the capillary to the syringe block by screwing the connector into the threaded cavity of the block.

- 3 Thread the free end of the capillary from the rear of the PSD through the o-rings on the probe arm.



Figure 11 Connecting capillary at the block and threaded through the o-rings

- 4 Undo and remove the brown knurled probe guide screw.
- 5 Push the end of the capillary through the capillary feed hole in the guide screw and then through the o-rings situated inside the probe holder.
- 6 Feed the capillary through the probe holder until it protrudes about 25 mm (1 in) from the base of the holder.
- 7 Gently tighten the probe guide screw until it just prevents the capillary from sliding through the holder.

NOTE

Do not over tighten the probe guide screw. Over tightening will cause the capillary to kink or bend.

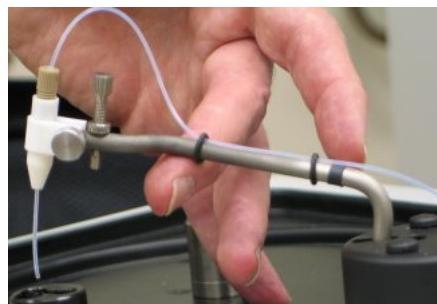


Figure 12 Capillary tubing in place

Adjusting the Probe

The probe (i.e., the end of the capillary protruding from the base of the probe holder) should be adjusted so that:

- The probe is correctly located in the center of the vials when picking up solution.
- The probe is correctly set during rinsing.
- The probe enters and leaves the graphite tube without touching the sides of the injection hole.
- The probe is set to the correct depth in the tube.

To correctly position the probe:

- 1 Make sure the GTA furnace is correctly aligned in the optical path and that your PSD is correctly installed. Refer to your GTA or spectrometer operation manual.
- 2 Place an empty vial in the dispenser carousel at position 1.
- 3 Create a Furnace Method. Refer to online Help.
- 4 Go to the **Analysis** page.
- 5 Select **Furnace Facilities** from the **Instrument** menu.
- 6 Turn on the lamp (and camera, if fitted).
- 7 Click **Align**. The sampler will position the capillary at position 1 in the fully down position.
- 8 Check the probe is correctly aligned, refer to **Figure 13**. The probe should almost reach the bottom of the vial but not actually touch it. If the end of the probe is too far from the bottom of the vial, or if it touches the bottom of the vial:
 - a Loosen the probe guide screw and adjust the capillary length as required.
 - b If necessary, loosen the probe holder screw and adjust the angle of the probe until it is vertically aligned in the vial.

NOTE

Remember to retighten the screw on the probe holder when finished.

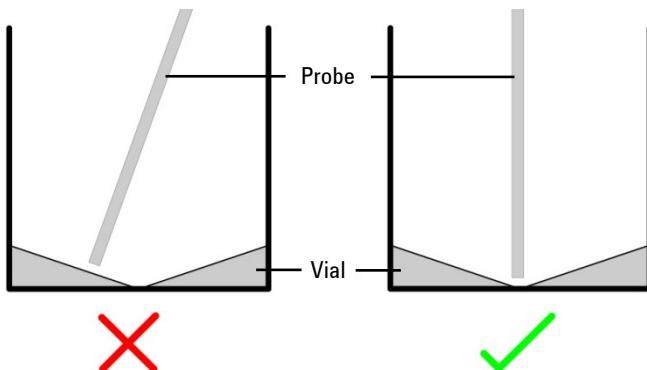


Figure 13 Probe positioning in a sample vial

- 9 Once the correct probe length has been set in the vial, click **OK** on the confirm dialog, this will move the probe to the furnace workhead. Place a finger under the probe arm as the capillary starts to descend into the furnace and gently lower the arm by hand.
- 10 Release the locking knob located underneath the PSD. Use the sideways and in/out adjuster knobs to adjust the sampler position, such that when lowered the probe enters the sample injection hole of the graphite tube without hitting the sides.

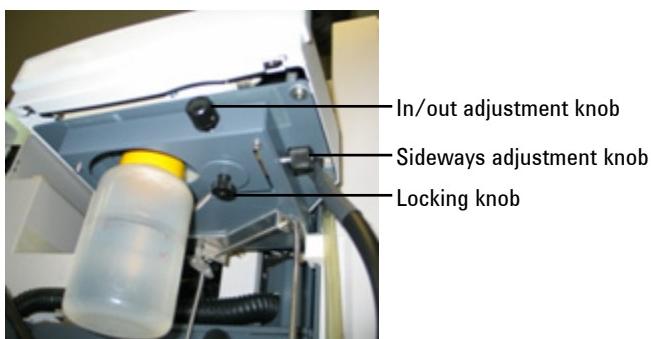


Figure 14 Locking and adjustment knobs on underside of PSD

TIP

Avoid misalignment by always performing adjustments with a straight capillary.

- 11 With the capillary correctly centered, lock the sampler in place using the locking knob.
- 12 Lower the capillary into the graphite furnace. With the capillary down in the furnace, use the depth adjuster screw to set the capillary to about 1 mm above the bottom of the tube or platform. Tighten the lock-nut.

TIP

Use the mirror or optional camera to check this distance.

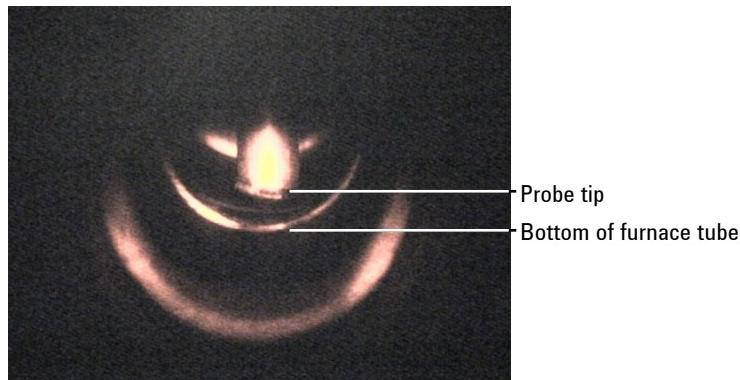


Figure 15 Probe tip position in furnace tube, as viewed with camera option

- 13 Once the probe height has been correctly set, click **OK** on the confirm dialog. The probe arm will return to the drain vessel and a rinse will be performed.

NOTE

You may need to readjust the height of the capillary during method development.

Rinsing the System

Before the system can be rinsed you must create a furnace method. (For information about how to create a furnace method, refer to the Help.)

To check that the probe is being rinsed properly:

- 1 Click **Rinse** in the **Furnace Facilities** dialog. The probe arm will raise, move over the reference position on the carousel, and then return to the rinse vessel.
- 2 Once the probe reaches the rinse vessel, manually lift the probe arm so that you can clearly view the end of the probe. Check that there is a continual flow of rinse solution from the probe.

Removing the PSD

WARNING

Corrosive Liquid

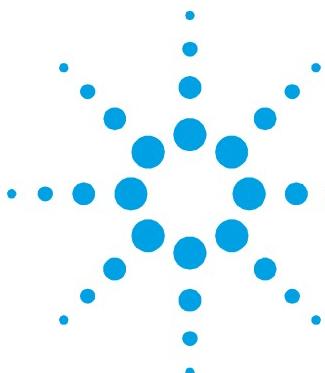


The PSD may contain materials which may be corrosive or otherwise hazardous. Always ensure that laboratory safety practices governing the use, handling and disposal of chemicals and laboratory samples and standards are strictly observed. These safety practices should include the wearing of appropriate protective clothing when handling hazardous chemicals.

To remove and disconnect your PSD:

- 1 Remove the carousel, being careful not to spill any solutions which may be in the carousel.
- 2 Flush the rinse vessel completely using distilled water.
- 3 Remove the drain tubing.
- 4 Turn the GTA power supply off.
- 5 Open the front door on the GTA and disconnect the connecting cable by pressing the spring clips on both sides of the connector and pulling the connector out.

- 6** Disconnect the gas supply by pressing the release catch underneath the gas connector and pulling the gas plug out.
- 7** Remove the cover from the left hand side of the instrument and take the connecting cable and gas connection out. Refit the cover.
- 8** Loosen the clamping screw securing the PSD to the instrument sample compartment.
- 9** Lift the sampler away from the sample compartment, pull down the legs of the PSD bracket and stand the PSD on a suitable storage shelf or bench.



5. Operation

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General

Clean your accessory after use, and clean spills immediately.

If necessary, use a mild detergent with a non-scouring applicator. Do **not** use abrasive cleaners.

Follow approved procedures when handling and cleaning biological material.

Checking and Cleaning the Probe Tip

The probe tip should be clean, straight and the opening must be cut cleanly at a right-angle to the capillary.

If the probe tip is damaged, cut off the damaged portion with a sharp scalpel or razor blade. Cut the capillary neatly at a right angle. Remove the smallest length of capillary possible. If necessary, draw extra capillary tubing through the o-rings on the probe arm to lengthen the probe tip. Refer to the 'Fitting the Probe' on Page 22.

NOTE

Wipe the outside of the tip occasionally with dilute acid (e.g., 1% HNO₃) on a tissue.

Replacing the Syringe

WARNING



Sharp Object

If the glass syringe is broken during removal or replacement, the pieces of broken glass can cause severe injury.

To replace the syringe:

- 1 Pull down the hinged cover to access the syringe module.
- 2 Carefully pull the syringe block assembly and syringe from the module, as shown in Figure 16.

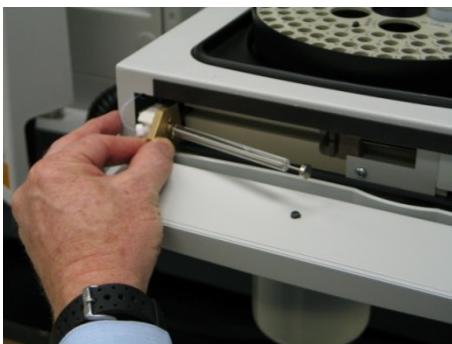


Figure 16 Removing the syringe block assembly and syringe

- 3 Unscrew the syringe from the block assembly.
- 4 Screw the replacement syringe into the block assembly.

- 5 Replace the syringe block assembly and syringe into the module.



Figure 17 Replacing the syringe block assembly and syringe

- 6 Push up the cover to close the module.
- 7 Prepare the syringe for use according to the instructions in the ‘Rinsing the System’ section, Page 27.

Replacing the Syringe Plunger

To replace the syringe plunger:

- 1 Pull down the hinged cover to access the syringe module.
- 2 Remove the plunger from the syringe, as shown in Figure 18.



Figure 18 Removing the plunger of the syringe

- 3 Insert the replacement plunger into the syringe, as shown in Figure 19.

Operation

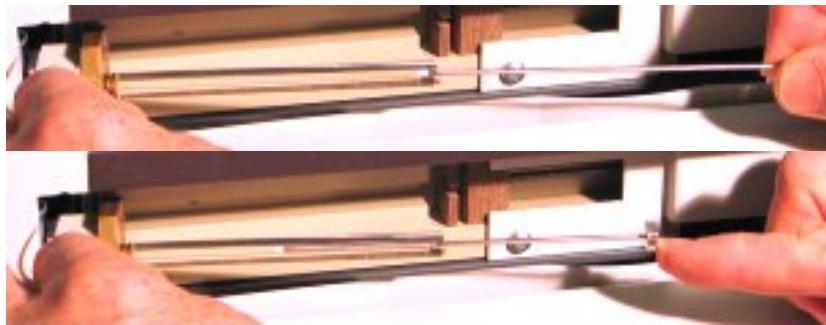


Figure 19 Replacing the plunger of the syringe

Refilling the Rinse Bottle

To refill the rinse bottle:

- 1 Unplug the PSD gas connection plug, as shown in Figure 20. This will allow the pressure in the bottle to return to atmospheric pressure.



Figure 20 Removing the plunger of the syringe

WARNING**Corrosive Liquid**

The rinse may be corrosive or otherwise hazardous. Handle the rinse bottle with care to avoid spillage. Wearing appropriate protective clothing when handling hazardous chemicals.

- 2 Unscrew the rinse bottle.



Figure 21 Removing the rinse bottle

NOTE

The cap of the rinse bottle remains in position underneath the PSD.

- 3 Ensure that the o-ring in the bottle cap is in position and correctly seated, as shown in Figure 22.

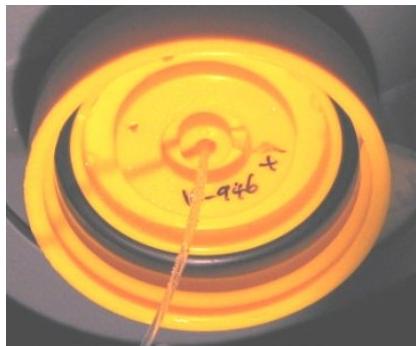


Figure 22 Rinse bottle cap with o-ring correctly positioned

- 4** Refill the rinse bottle with rinse.
- 5** Screw the bottle firmly back into its cap.
- 6** Reconnect the PSD gas connection plug.

Spares

NOTE

Unless otherwise indicated, use only genuine Agilent-parts.

Table 1 Part numbers for PSD spares and consumables

Description of Part	Part Number
Carousel	
Standard carousel with dust cover	9910129500
130-Sample carousel for PSD 120	9910113100
Replacement carousel plate, for standard carousel	5410056900
Moulded carousel cover	6210106100
Vials and vessels	
Microvials, 2 mL conical (pack of 1000)	9910028200
Microvials, 1.1 mL (pack of 2000), for 130 carousel only	6610025900
Plastic vessels, 10 mL (pack of five)	9910115600
Rinse bottle	
Rinse bottle, 1 L	6610012100
Cap for rinse bottle	1610094600
O-ring for rinse bottle cap	6910025900
Syringe	
Replacement syringe	4710003200
PTFE-tipped plunge	4710003100
Capillary assembly (pack of five)	9910115100
Viewing mirror	9910091200
Drain tubing, 6 mm ID (2 m required)	3710009200

In This Book

The manual describes the following:

- Safety Practices and Hazards
- Introduction
- Specifications
- Getting Started
- Operation

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